

April 19, 1938.

O. H. MANZ

2,114,850

DUPLICATING MACHINE

Filed Aug. 8, 1935

3 Sheets-Sheet 1

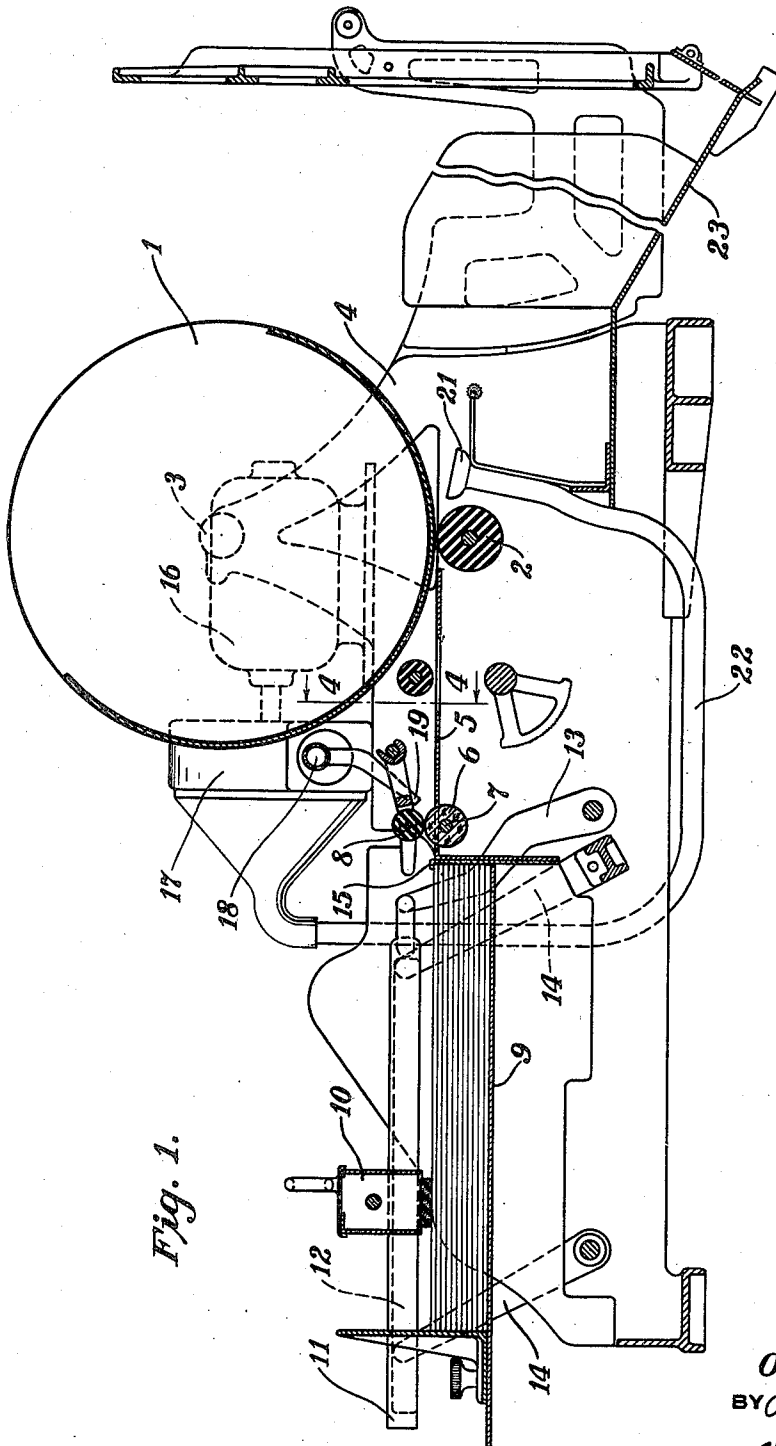


Fig. 1.

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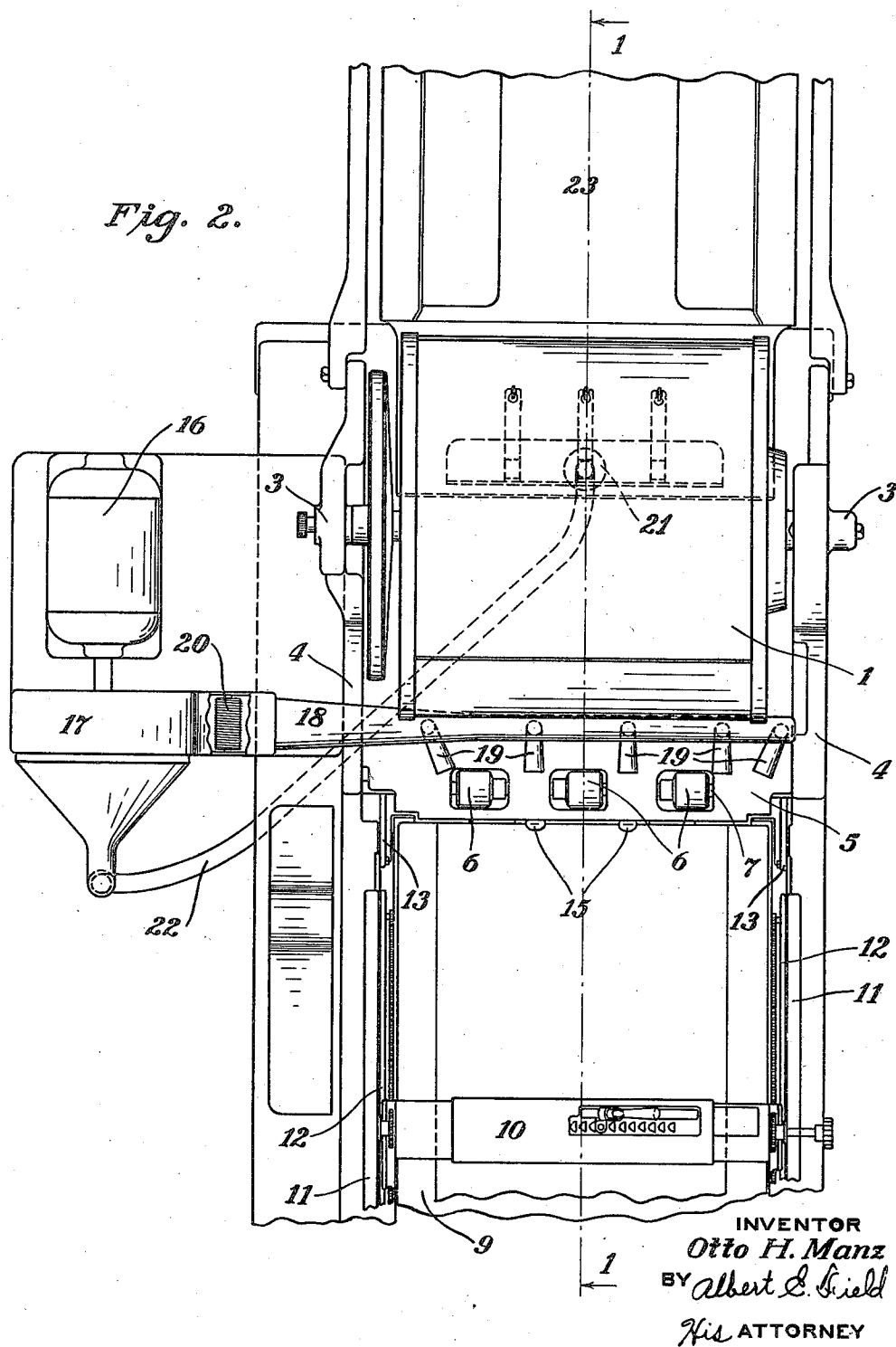
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3 Sheets-Sheet 2

*Fig. 2.*



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3 Sheets-Sheet 3

*Fig. 3.*

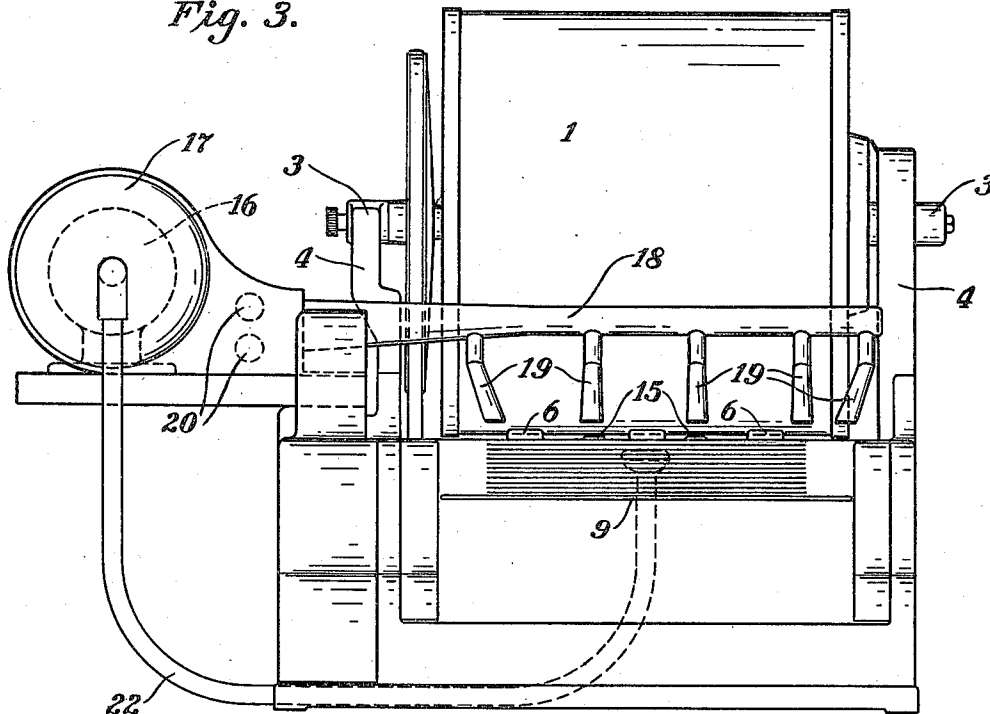
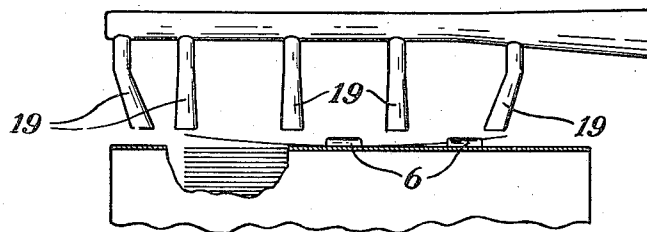


*Fig. 4.*



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## UNITED STATES PATENT OFFICE

2,114,850

## DUPLICATING MACHINE

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Application August 8, 1935, Serial No. 35,336

5 Claims. (Cl. 101—118)

This invention relates to improvements in duplicating machines particularly the type commonly known as mimeograph machines. A source of difficulty with these machines is the collection of lint, or particles of paper, on the sheets being printed, that is carried into contact with the stencil and which soon ends its usefulness. One of the objects of this invention is means whereby the lint is disposed of before reaching the stencil.

Another object of my invention resides in the provision of means for separating the edges of the paper stock and blowing the sheets apart whereby only one at a time will pass through the machine. My invention also comprises novel means for stripping the paper from the stencil after it has been printed and guiding it into the receiving rack, thus preventing the sheet from passing around with the stencil and clogging the apparatus. In addition the invention provides means for rapidly drying the ink on the paper to prevent smudging of the printed matter by successively delivered sheets.

Other features and advantages of the invention will be hereinafter described and claimed.

In the accompanying drawings:

Figure 1 is a view in vertical section through a duplicating machine incorporating my invention, taken on line 1—1 of Figure 2.

Figure 2 is a top view of a machine embodying my invention.

Figure 3 is an end elevation with some of the parts removed.

Figure 4 is a view taken on line 4—4 of Figure 1.

For the purpose of illustrating the principle of my invention, I have shown it embodied in a duplicating machine of usual construction. The sheet delivery means of the duplicating machine as shown in the drawings comprises a cylinder 1 for holding the stencil or other printing means and an impression roller 2. The cylinder 1 is mounted on trunnions 3 in the upper part of the side walls 4 of the frame of the machine.

As the sheets to be printed are fed between the cylinder and impression roller they pass over a feed table 5 supported from the frame of the machine. The sheets may be fed into the machine by the feed rolls 6 in the manner which is usual for machines of this type, and are mounted on a shaft 7 driven by gears in timed relation to the rest of the machine. A roll 8 carried by a yoke pivoted on an axis transverse to the machine acts to hold the sheet of paper down against the feed rolls 6.

The stack of sheet paper from which the feed rolls 6 successively remove the uppermost sheet is supported on a table 9 which is continuously raised in the usual manner during operation of the machine so as to maintain the top sheet in proper position to be fed into the machine. The paper feed carriage 10 is mounted on rails 11 and 12 and is moved back and forth by the action of members 11 and 12, which members are pivotally mounted on arms 13 and 14 respectively. The arrangement in part illustrated by members 10 to 14 is known as the sheet feeding mechanism and its purpose is to remove one sheet at a time from beneath the paper grippers 15 and deliver it to the feed rolls 6 and 8. The paper grippers 15 move up and down in properly timed relation to the other parts to release and grip the front end of the stack of paper in the usual manner.

The paper stock used in these machines is cut to the desired size for printing and is almost always found to have lint or small particles of paper along the edges of the sheets. This is particularly true of heavy paper or light cardboard such as is used for printing time cards. As the sheets are fed into the machine, a considerable amount of this lint is carried by the sheets and sticks to the stencil with the result that the stencil becomes too smeared to print properly. It is then necessary to stop the machine and clean the stencil. The cleaning operation, which is performed with a soft brush or sponge smears the ink on the stencil and several sheets must be run through the machine before the printing is again satisfactory. A stencil can only stand so much cleaning to remove the lint and I have found that after printing from 5,000 to 10,000 sheets the stencil must be discarded. After a certain amount of lint becomes attached to the stencil it is forced therethrough making holes therein, thus ending its usefulness and constitutes another reason for it being prematurely discarded.

One part of my invention comprises a method and apparatus for removing the lint from the sheet before it reaches the stencil. As a result of my improvement I can use the same stencil to print from 150,000 to 200,000 sheets without having to clean it.

To accomplish the above result, means are provided for directing a stream or streams of air onto the paper in a direction that will blow the lint away from the stencil roll. The means comprise a blower or fan enclosed by the housing 17 driven by a motor 16. The air under pressure is

carried through a pipe 18 to nozzles 19, which nozzles are positioned between the paper stock and the stencil roll. The air from the nozzles blows all of the lint or other small particles off of the paper thus obviating any possibility of them being fed into the machine. The nozzles have another function in that they are positioned so that the stream of air strikes one end of the paper stack and causes the sheets to be separated.

By this means it is possible to print much thinner paper than heretofore. When very thin paper is used the sheets tend to stick together and the carriage 10 often pulls back two or more sheets of paper at a time from beneath the paper grippers 15 instead of only one with the result that many blank sheets pass through the machine. When the stream of air is used the sheets in the upper part of the paper stack are separated (as shown in Figure 4) and the tendency to stick is overcome. It has been found impractical to use paper thinner than what is known as 16 pound paper (16 pounds to the ream) in mimeograph machines because of the difficulty in feeding a thinner paper. With the air blower 11 pound paper can be fed through the machine one sheet at a time.

Figure 4 illustrates the action of the air in separating the sheets. The nozzles 19 at each side of the machine first blow the adjacent corners of the paper upward since the sheet will bend easier at the corners than at intermediate points thereof. After the corners are raised the air from the intermediate nozzles raises the center of the sheet. In operation the action is almost instantaneous and the top sheet is separated back to the feed carriage 10 after it is released by the paper grippers 15.

It is customary in machines of this sort to interleave blotters or separators between the sheets after they have been printed. This is necessary to prevent smudging due to contact between successive sheets before the ink is dry. I have found that heating the paper just before it is printed will dry the ink sufficiently to eliminate smudging, thus obviating the use of blotters and interleaving mechanism. I prefer to heat the stream of air as by passing it over an electric heater coil 20 mounted in the pipe 18 (see Figure 2). The hot air constantly blown on the paper warms it enough to dry the ink after the sheet has been printed.

Means are also provided for positively causing the paper to leave the stencil roll after being printed. The nozzle 21 is connected by a hose 22 to the air input side of the blower. A partial vacuum is thereby created at the end of nozzle 21 which reduces the air pressure beneath the printed sheet as it is delivered from the stencil roll. The air pressure above the sheet being greater than that below, results in the sheet being peeled from the roll and sliding down into

the rack 23 which is provided to receive the printed sheets. I have found that if means are not provided to positively remove the paper from the stencil roll it is apt to stick to the stencil, revolve with it and clog up the mechanism. This also often ruins the stencil.

Furthermore, the action of the partial vacuum created at nozzle 21 guides the paper in such a manner that the successive sheets are placed in a neat pile greatly facilitating counting and making into pads.

It may thus be seen that my invention provides means for greatly increasing the life of the stencil, assures delivery of a single sheet at a time, eliminates complicated interleaving mechanism and positively removes printed sheets from the stencil. The apparatus is simple and inexpensive and may be easily applied to any duplicating machines now in use.

The terms and expressions which I have employed are used as terms of description and not of limitation, and I have no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof, but recognize that various modifications are possible within the scope of the invention claimed.

I claim:

1. In a duplicating machine, in combination, a stencil drum, means for feeding the paper to be printed into contact with the stencil, and means comprising a blast of air for preventing loose particles of matter from being carried by the paper into contact with the stencil.

2. In a duplicating machine, in combination, a stencil drum and paper feeding means, an air nozzle between said drum and a part of said feeding means, said nozzle being constructed and arranged to direct a blast of air on the paper to be printed to clear the paper of loose foreign particles before the paper reaches the stencil drum.

3. In a duplicating machine, a sheet delivery mechanism, a stencil drum, and means adjacent said drum constructed and arranged to create a partial vacuum beneath the sheets to cause the latter to leave the drum.

4. In a duplicating machine, a stencil drum, means for feeding the paper to be printed into contact with the stencil, and means above the paper directing a blast of air thereon for preventing loose particles of matter from being carried by the paper into contact with the stencil.

5. In a duplicating machine, a stencil drum, means for feeding the paper to be printed into contact with the stencil, and means above the paper and between said drum and a part of said feeding means constructed and arranged to direct a blast of air on the paper to be printed to prevent loose particles of matter from being carried by the paper into contact with the stencil.

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